
# Asia-Pacific Transportation Infrastructure

## Linking Food Sources to Urban Centers

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A century ago, the world's population was largely rural; only 5 percent lived in urban areas. But now, rapid growth in urban areas, particularly in developing countries, is making this the *century of the city*, particularly in the Asia-Pacific region, where half the population lives in urban areas, accounting for barely 2 percent of the land mass. Made up of countries on both sides of the Pacific Ocean — including Australia, Brunei, Canada, Chile, China, Hong Kong-China, Indonesia, Japan, Korea, Malaysia, Mexico, New Zealand, Papua New Guinea, Peru, Philippines, Russia, Singapore, Taiwan, Thailand, United States, and Vietnam— this region's urban areas are expected to grow by more than half a billion people in the next 20 years, almost three times the growth rate of the total population. Three-quarters of the growth will be in the less-developed economies of the region, with much of the growth arising from rural-urban migration. Urban populations are projected to increase by 300 million in China, 75 million in Indonesia, and 25 million in Mexico.

National income is also increasingly concentrated in urban areas, which are home to most of the middle and upper classes and the source of a disproportionate share of the economy's output. Shanghai, for example, accounts for 1 percent of China's population, but generates 12 percent of the nation's gross national product. Higher incomes bring greater per capita food demand and diets richer in meat, fruits, and vegetables than those in rural areas. In urban locales, demand is also greater for food services, convenience, and eating away from home.

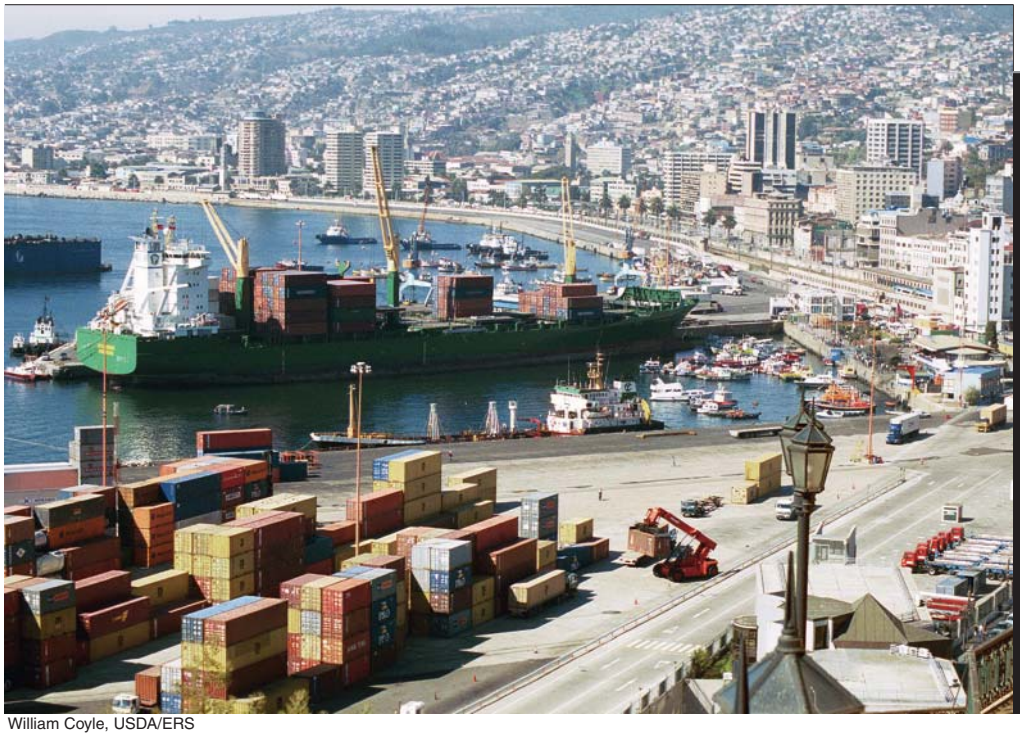
These demand trends will profoundly affect food markets around the region. Transportation infrastructure—roads, railroads, inland waterways, ports, and airports—will play a critical role in supporting the movement of raw agricultural material and food from dispersed producing regions, either domestic or foreign, to urban areas. However, while transportation infrastructure plays an important role in providing affordable food to burgeoning urban areas, other factors—agricultural, regulatory, and trade policies, for example—play a role as well.

## Food Demand Concentrated, Food Supply Dispersed

To meet growing urban-based food demand requires a sophisticated food system to store, refrigerate, and deliver food to retail outlets. Well-functioning roads and mass transit systems regularly bring large numbers of people to these outlets. Strong linkages to food-producing regions, both domestic and foreign, assure a steady flow into the city of raw agricultural material, and processed and fresh food. In the developing parts of the Asia-Pacific region, the rapid spread of supermarket chains—characterized by centralized procurement and distribution, a broader geographic range of operations, and fewer but larger volume suppliers—reflects pressure to keep food costs relatively low while coping with the complexity of urban environments. Modern supermarkets account for a growing share of retail food sales and are displacing traditional wet markets and "mom and pop" shops.

While urbanization is leading to more concentrated food demand, agricultural production capacity in the Asia-Pacific region and elsewhere remains widely

**Wuhan, China's fourth-largest city, is a key railroad hub and lies on the Yangtze River, the country's longest inland waterway.**



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**Valparaiso is Chile's second largest port and closely linked to the country's capital, Santiago, 120 kilometers (70 miles) to the southeast.**

dispersed. With the exception of mountainous and arid regions, food production is located throughout North America, in pockets along the western coast of South America, throughout much of Southeast Asia, along the eastern and southern coastal areas of Australia, and in the eastern half of China. Nearly every state, province, and prefecture of the region produces some food, yet many food-producing areas struggle to be economically viable. Large areas of Southeast Asia and Southern China, for example, have good soils but suffer from lack of adequate infrastructure to profitably access markets and yield-enhancing inputs, including seeds, fertilizer, and pesticides.

## Coastal Urban Areas Accessible to Foreign Suppliers

Many rapidly growing urban areas across the developing parts of the Asia-Pacific region are concentrated along coastlines. These cities, by modernizing their port facilities, can take advantage of the low costs of ocean transport and thus facilitate linkages with foreign food suppliers. They can also benefit domestic producers who want to export.

*The Asia-Pacific region has the world's three busiest container ports—Hong Kong (China), Singapore, and Shanghai.*

Jakarta, Manila, Shanghai, Shenzhen, and Bangkok are among the largest, most rapidly growing coastal urban areas in the Asia-Pacific region. Beyond these major cities, populations lean toward living in smaller cities and towns close to the major cities where the infrastructure tends to be better developed. About 60 percent of China's population lives in the 12 coastal provinces. More than half of Indonesia's population lives on 10 percent of the land area—the narrow island of Java—where many of the country's largest coastal cities, including Jakarta, are located.

Many developing economies invest first in modernizing port facilities and airports in or near large coastal urban areas, thus facilitating global trade, including trade in food and agricultural products. Part of this modernization may include privatizing government-owned entities, with private interests both providing scarce financial support for these expensive facilities and introducing market principles. Private-sector involvement creates incentives to conform to international standards of trade and adopt fast-changing shipping technology. Private interests have played an important role in port development in Malaysia, the Philippines, Mexico, Korea, Thailand, and Vietnam.

The extent of port modernization can be measured by growth in container throughput or such productivity indicators as "moves per crane per hour." A shipping container is a standardized box, typically either 20 feet long, 8 feet high, and 8.5 feet wide (a 20-foot-equivalent unit TEU) or 40 feet long, 8 feet high, and 8.5 feet wide (2 TEUs). Containerized shipping is commonly used for perishable and other processed food products but is even making inroads with bulk commodities, like grains and oilseeds.

The Asia-Pacific region has the world's three busiest container ports—Hong Kong (China), Singapore, and Shanghai. In 2003, the region's overall container throughput grew 13.5 percent. Shanghai's growth was the most spectacu-

lar, expanding from half a million TEUs in 1990, when the port ranked 40th in the world, to 11.3 million in 2003, when it became the world's third-busiest port. China's top 10 ports grew 24 percent between 2002 and 2003; Ningbo (near Shanghai) and Chiwan (1 of 3 Shenzhen ports near Hong Kong), both grew more than 40 percent. Ports in Korea and Malaysia are also growing rapidly.

While customs regulations and other barriers might slow down port clearance in the less developed parts of the region, the port facilities themselves are approaching "best practices" and are equal in "moves per crane per hour" to ports in the more developed economies. Shanghai averaged 28 moves per crane per hour in 2003, Manila International Container Terminal averaged 32, and Malaysia's Tanjung Pelapas, 32, comparing well with

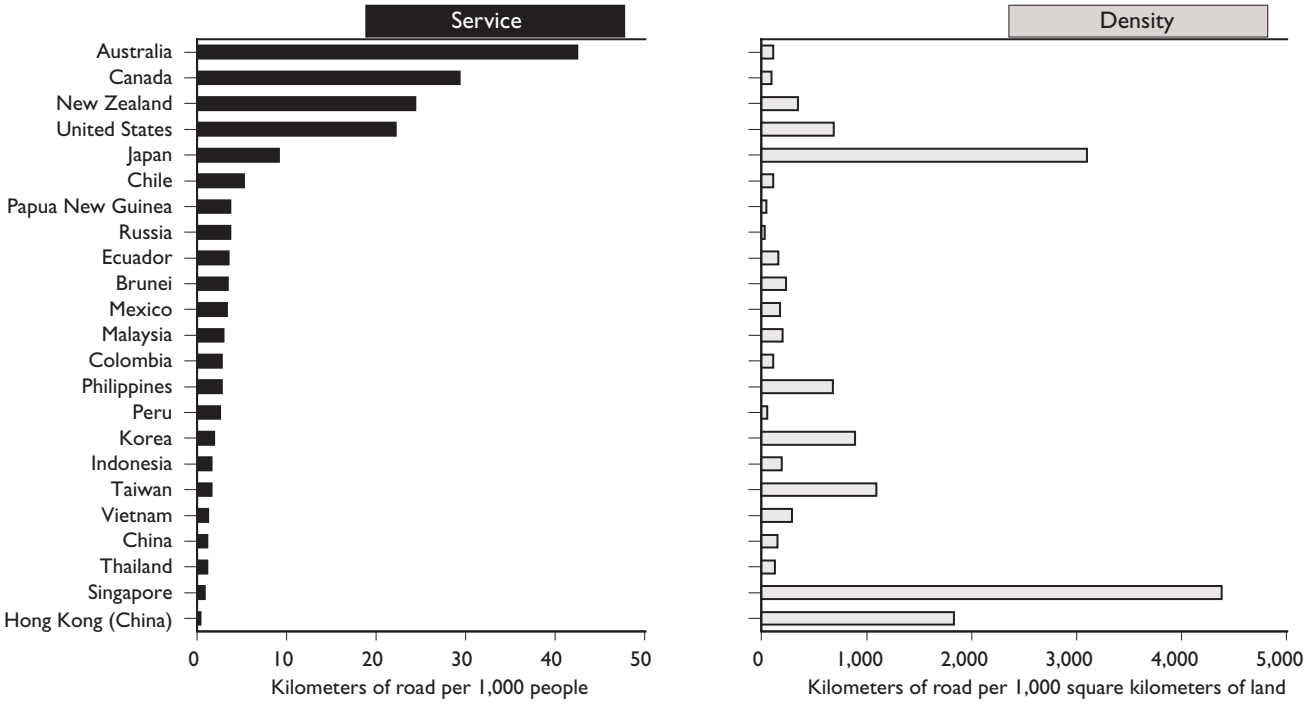

A rubber-tired gantry moves and stacks containers at northern Vietnam's new deepwater container port at Cai Lan in Quang Ninh province.

Sydney at 27, Southern California ports at 25-26, and Rotterdam at 30.

The low cost of ocean shipping, the cheapest of all transportation modes over long distances, enhances linkages between urban port cities and foreign suppliers. Containerized shipping also conforms well with the standards and product volumes that modern cost-conscious supermarkets prefer. Thus, in some instances, foreign suppliers may be more competitive in these coastal markets than are domestic producers.

The ability of domestic producers to penetrate urban, coastal markets and compete with foreign suppliers depends on the quality and extent of roads, railroads, and other infrastructure that connect these markets with food-producing areas in the country. In the Asia-Pacific region, the quality and extent of road and rail systems vary greatly. As measured by length

**Road service and density in the Asia-Pacific region**




Source: Pacific Food System Outlook and World Bank.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Hong Kong, the busiest container port in the world, is now challenged by ports in Singapore, Shanghai, and nearby Shenzhen.

of road or rail per square kilometer, transportation infrastructure is generally more developed in the higher income, densely populated economies of East Asia: South Korea, Taiwan, and Japan. In terms of length of road or rail per capita, infrastructure is more developed in Australia, Canada, New Zealand, and the United States. By both measures, the less developed economies in China, Southeast Asia, and Latin America significantly underinvest in road and rail infrastructure.

This underinvestment results in higher domestic shipping costs and slower delivery times. For example, the overland shipping cost of a container from Chongqing in central China to Shanghai is more than double the maritime transport cost from Los Angeles to Shanghai, even though the distance is about one-seventh as great.

In Southeast Asia, the fragmented geography of Indonesia and the Philippines and poorly developed infrastructure increase shipping times and the possibility of spoilage. Fruit delivery by truck from Manila to Davao on the southern island of Mindanao requires two ferry crossings and 3 days to cover 850 kilometers (510 miles). (See box, "Examples of Infrastructure Development in the Asia-Pacific Region.")

## Transportation Infrastructure Affects the Economy

The transportation infrastructure within a country facilitates competition in food products and services, which promotes more efficient resource allocation and lower food costs. Thus, maintaining, upgrading, and expanding the infrastructure plays an important role in supporting economic growth. For farmers, new or upgraded infrastructure has a similar effect as the removal of a general tax. It can lower transaction costs for marketing products and purchasing inputs, reduce the likelihood of post-harvest losses by increasing the quantity and quality of transport services, and ultimately bring higher returns for the producer and lower food costs for the consumer.

A simple example illustrates these dynamic food system impacts. With construction of a dirt road and a few bridges to connect a poor isolated rural area with a main highway, farmers can reach markets more quickly even using traditional transportation modes, such as foot, bicycle, or animal-drawn cart. Eventually, farmers can take advantage of motorized vehicles to bring in production inputs and deliver harvested produce to local markets more quickly, in larger volumes, and with less spoilage. Rural households gain better access to health care and schools, contributing to higher labor productivity on the farm. When the road is paved, costs decline even further, as marketing times diminish and weather is less of an obstruction to travel.

While transportation infrastructure is needed to lower food costs to urban consumers by connecting surplus food-producing areas with cities, it may not be suf-

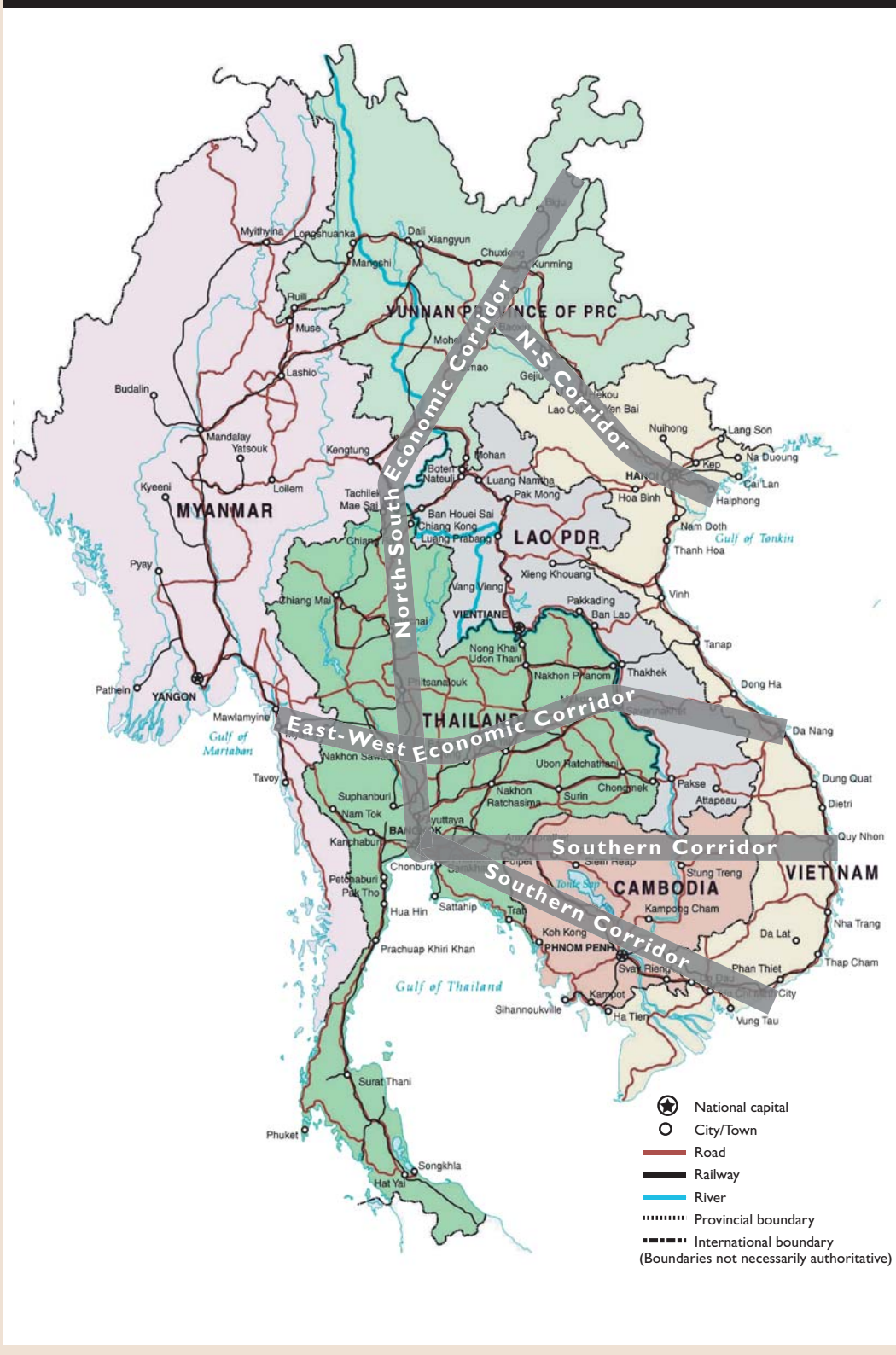
# Examples of Infrastructure Development in the Asia-Pacific Region

Infrastructure development is best examined on a case-by-case basis because it plays a central but varied role in different parts of the region. Three examples illustrate how the development of transportation infrastructure is improving the connections between agricultural areas and consumers in the Asia-Pacific region, creating a more seamless food system.

**China** is making a major effort to connect interior provinces with populous coastal areas. This effort includes a $42-billion program to add 10 percent to China's rail system by 2006 and extensively developing and enhancing inter-Provincial road systems. As a result of the construction of the Three Gorges Dam, navigability of the Yangtze River now extends over 1,000 miles from Shanghai to Chongqing. This, along with other infrastructural development, is making the Yangtze River basin, a potential rival to the Guangzhou-Pearl River delta area adjacent to Hong Kong in southern China, currently one of the most important manufacturing centers in the country. Collectively, these developments are making food delivery to urban areas faster and cheaper, raising returns to farmers, and lowering consumer costs. They are also making domestic products (e.g., citrus, semitropical fruit, and certain vegetables) more export competitive.

**The North American Free Trade Agreement** (NAFTA), which includes the U.S., Mexico, and Canada, has focused on developing infrastructure in the north-south corridors to better integrate Mexico, which is less developed than the other two members. Infrastructure development in Mexico has been rapid, with road systems expanding 30 percent during 1990-2000. Privatizing Mexico's rail system in the late 1990s and forming joint ventures with other North American rail companies has improved service and raised the share of freight transported by rail.

## Greater Mekong subregion's road development



Border constraints, protectionist policies, and concerns about illegal immigration and sanitary and phytosanitary issues continue to hamper intra-NAFTA trade. A reciprocal U.S.-Mexico truck agreement still has not been implemented, and cabotage policies constrain the freedom of truck and marine shipping by allowing only domestic companies to transport goods within a country. These constraints, however, are offset by advances in information technology, pre-border clearance, and expanding intermodal systems (involving more than one form of transportation service—rail, truck, marine, or air—during a single journey). Improving roads and rail systems are reducing the cost of transporting U.S. grain to Mexico's industrial heartland (the area outlined by Mexico City, Monterrey, and Guadalajara) and Mexican horticultural products to U.S. and Canadian markets.

A major project in the **Greater Mekong subregion** is underway to better integrate five Asian countries (Vietnam, Laos, Cambodia, Thailand, and Myanmar) and China (Mekong River watershed). The project, supported by national governments and the Asia Development Bank, is designed to, among other objectives, link remote agricultural areas with urban centers and ports. Three major road or economic corridors are being developed: one between southern China and Bangkok, Thailand, and southern China and Hanoi; a second between Myanmar and Da Nang, Vietnam; and a third between Bangkok, Thailand, and Ho Chi Minh City and other parts of Vietnam. Customs procedures are being streamlined to reduce time spent at border checkpoints. The project potentially will benefit 70 million people living in the Mekong basin, many of whom are subsistence farmers. Travel times and transport costs have declined, and food produced in remote rural areas can now more easily reach major urban markets and, through ports, export markets.

ficient. For example, a country's agricultural, regulatory, or trade policies can negate the benefits from new or upgraded infrastructure. Sometimes investments are made in infrastructure to alleviate bottlenecks, when the real problem lies in regulatory policies that support certain economic interests. For example, traffic congestion at the U.S.-Mexico border results from policies requiring reciprocal truck access and inspection, not lack of adequate transportation infrastructure. Tariffs and other import restrictions affect the flow of food products from domestic and foreign sources. Other laws and regulations, such as cabotage, which requires national flag vessels to provide domestic intercoastal service, affect the cost of transportation services. Governments also impose duties on transportation through licenses, tolls, and fuel taxes that ultimately get passed on to agricultural producers and consumers.

## Investment Is Key, but Not Sufficient

Keeping food costs low for growing urban populations poses a major challenge in this century of the city. A key component is investment in streamlining domestic supply chains, including expensive transportation infrastructure to connect urban centers with food-producing areas; in facilitating food imports through trade-liberalizing measures; or in some combination of approaches.

Most infrastructure is a public good. Once the initial investment is made, many interests can use the good, often without payment. The potential for free riders means that market forces alone tend to result in underinvesting in infrastructure. Hence, governments are crucial in encouraging and funding infrastructure investments.

The largest share of financial support comes from local and national governments and private investors. International financial institutions (Asia Development Bank, World Bank, Inter American Development Bank) have played modest roles, about $5 billion per year in loans of the estimated $100 billion needed for new investment and maintenance of rail and road infrastructure in developing countries, according to the World Bank. And bond markets need to be further developed to allow governments to tap into the high savings rates of Asia-Pacific economies for funding expensive long-term infrastructural projects.

Investing in transportation infrastructure alone cannot create an efficient food supply system. An efficient supply system also requires appropriate economic incentives, competitive transportation and logistic services, and policy reforms. Discussions about agricultural market reform across the region, which tend to focus more narrowly on commodity and farm policies, must be expanded to include these broader issues.

**This article is drawn from. . .**

"Where Will Demographics Take the Asia-Pacific Food System?" by William Coyle, Brad Gilmour, and Walter J. Armbruster, in *Amber Waves*, Volume 2, Issue 3, USDA, Economic Research Service, June 2004, available at: www.ers.usda.gov/amberwaves/june04/features/wherewilldemographics.htm

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